查询DV200-2800D供应商

# DV200-2800D Series

## HIGH RELIABILITY DC-DC CONVERTERS

### DESCRIPTION

The DV200 series of high reliability, isolated DC-DC converters is operable over a wide (-55 °C to +100 °C) temperature range with no power derating. Unique to the DV200 series is a magnetic feedback circuit that is radiation immune. Operating at a nominal fixed frequency of 500 kHz, these regulated, isolated units utilize well-controlled undervoltage lockout circuitry to eliminate slow start-up problems. The current sharing function allows a maximum of five units to be connected in parallel to boost the total output power to 5 times. The output voltage is trimmable up to +10% or down –20%.

These converters are designed and manufactured in a facility qualified to ISO9001 and certified to MIL-PRF-38534 and MIL-STD-883.

### FEATURES

- High Reliability
- Output Voltage Trim Up +10% or Down –20%
- Wide Input Voltage Range: 16 to 50 Volts
- Up to 200 Watts Output Power
- Up to 70% of Rated Output Power is Available for Each Output
- Radiation Immune Magnetic Feedback Circuit
- NO Use of Optoisolators
- Undervoltage Lockout
- Short Circuit Protection
- Current Limit Protection
- Input Transient Voltage: 55 Volts for 1 second
- High Power Density: ≈ 80 W/in$^3$
- Custom Versions Available
- Additional Environmental Screening Available
- Meets MIL-STD-461C and MIL-STD-461D EMC Requirements When Used With a DVMN28 EMI Filter

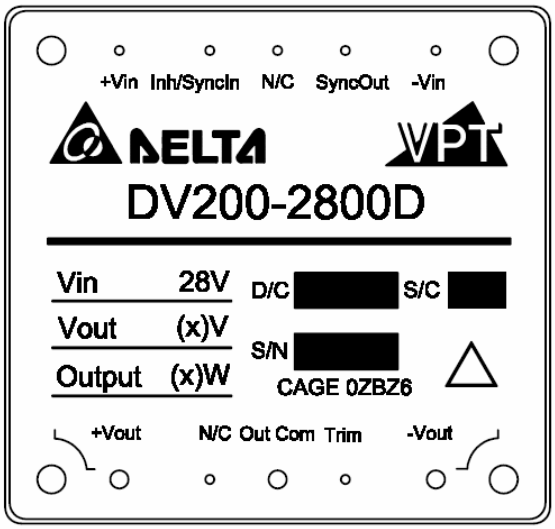


**Figure 1** – DV200-2800D DC-DC Converter
(Not To Scale)



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## SPECIFICATIONS ($T_{CASE}$ = -55°C to +100°C, $V_{IN}$ = +28V ± 5%, Full Load, Unless Otherwise Specified)

### ABSOLUTE MAXIMUM RATINGS

| | | | |
|---|---|---|---|
| Input Voltage (Continuous) | 50 $V_{DC}$ | Junction Temperature Rise to Case | +25°C |
| Input Voltage (Transient, 1 second) | 55 Volts | Storage Temperature | -65°C to +135°C |
| Output Power[1,3] | 200 Watts | Lead Solder Temperature (10 seconds) | 270°C |
| Power Dissipation (Full Load, $T_{CASE}$ = +100°C) | 44 Watts | Weight (Maximum) | 115 grams |

| Parameter | | Conditions | DV200-2805D | | | DV200-2812D | | | Units |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| **STATIC** | | | | | | | | | |
| INPUT Voltage[7] | | Continuous | 16 | 28 | 50 | 16 | 28 | 50 | V |
| | | Transient, 1 sec | - | - | 55 | - | - | 55 | V |
| Current | | Inhibited | - | 6 | 10 | - | 6 | 10 | mA |
| | | No Load | - | 20 | 80 | - | 20 | 80 | mA |
| Ripple Current | | Full Load[5], 20Hz to 10MHz | - | - | 100 | - | - | 100 | $mA_{p-p}$ |
| Inhibit Pin Input[4] | | | 0 | - | 1.5 | 0 | - | 1.5 | V |
| Inhibit Pin Open Circuit Voltage[4] | | | 8 | 9.5 | 11 | 8 | 9.5 | 11 | V |
| UVLO Turn On | | | 13.5 | 14 | 15.8 | 13.5 | 14 | 15.8 | V |
| UVLO Turn Off[4] | | | 10 | 12 | 14 | 10 | 12 | 14 | V |
| OUTPUT Voltage | $+V_{OUT}$ | $T_{CASE}$ = 25°C | 4.95 | 5.00 | 5.05 | 11.88 | 12.00 | 12.12 | V |
| | $+V_{OUT}$ | $T_{CASE}$ = -55°C to +100°C | 4.925 | 5.00 | 5.075 | 11.82 | 12.00 | 12.18 | V |
| | $-V_{OUT}$ | $T_{CASE}$ = 25°C | 4.80 | 5.00 | 5.20 | 11.76 | 12.00 | 12.24 | V |
| | $-V_{OUT}$ | $T_{CASE}$ = -55°C to +100°C | 4.85 | 5.00 | 5.25 | 11.52 | 12.00 | 12.48 | V |
| Power[3,6,7] | Total | $V_{IN}$ = 18V to 50V | - | - | 150 | - | - | 175 | W |
| | Total | $V_{IN}$ = 16V to 18V | - | - | 90 | - | - | 105 | W |
| | $\pm V_{OUT}$ | $V_{IN}$ = 18V to 50V Either Output | - | - | 105 | - | - | 122.5 | W |
| | $\pm V_{OUT}$ | $V_{IN}$ = 16V to 18V Either Output | - | - | 63 | - | - | 73.5 | W |
| Current[3,6,7] | $\pm V_{OUT}$ | $V_{IN}$ = 18V to 50V Either Output | - | - | 21 | - | - | 10.2 | A |
| | $\pm V_{OUT}$ | $V_{IN}$ = 16V to 18V Either Output | - | - | 12.6 | - | - | 6.1 | A |
| Ripple Voltage | $\pm V_{OUT}$ | Full Load[5], 20Hz to 10MHz | - | 50 | 150 | - | 50 | 200 | $mV_{p-p}$ |
| Line Regulation | $+V_{OUT}$ | $V_{IN}$ = 18V to 40V | - | 10 | 80 | - | 10 | 80 | mV |
| | $-V_{OUT}$ | $V_{IN}$ = 18V to 40V | - | 10 | 200 | - | 10 | 200 | mV |
| Load Regulation | $+V_{OUT}$ | No Load to Full Load[5] | - | 10 | 80 | - | 10 | 80 | mV |
| | $-V_{OUT}$ | No Load to Full Load[5] | - | 10 | 200 | - | 10 | 200 | mV |
| Cross Regulation | $-V_{OUT}$ | V1+ Load 30% - Load 70%<br>V2+ Load 70% - Load 30% | - | - | 550 | - | - | 550 | mV |
| Voltage Trim | | Full Load | -20 | - | 10 | -20 | - | 10 | % |
| EFFICIENCY | | Full Load[5] | 79 | 82 | - | 80 | 84 | - | % |
| LOAD FAULT POWER DISSIPATION | | Overload[4] | - | - | 80 | - | - | 80 | W |
| | | Short Circuit | - | - | 80 | - | - | 80 | W |
| CAPACITIVE LOAD[4] | | Either Output | - | - | 1000 | - | - | 1000 | µF |
| SWITCHING FREQUENCY | | | 450 | 500 | 550 | 450 | 500 | 550 | kHz |
| SYNC FREQUENCY RANGE | | $V_H - V_L$ = 5V<br>Duty Cycle = 20% - 80% | 450 | - | 550 | 450 | - | 550 | kHz |
| ISOLATION | | 500 $V_{DC}$, $T_{CASE}$ = 25°C | 100 | - | - | 100 | - | - | MΩ |
| MTBF (MIL-HDBK-217F) | | GB @ $T_C$ = 55°C | - | 955 | - | - | 955 | - | kHrs |

## SPECIFICATIONS ($T_{CASE}$ = -55°C to +100°C, $V_{IN}$ = +28V ± 5%, Full Load, Unless Otherwise Specified)

| ABSOLUTE MAXIMUM RATINGS | | | |
|---|---|---|---|
| Input Voltage (Continuous) | 50 $V_{DC}$ | Junction Temperature Rise to Case | +25°C |
| Input Voltage (Transient, 1 second) | 55 Volts | Storage Temperature | -65°C to +135°C |
| Output Power[1,3] | 200 Watts | Lead Solder Temperature (10 seconds) | 270°C |
| Power Dissipation (Full Load, $T_{CASE}$ = +100°C) | 44 Watts | Weight (Maximum) | 115 grams |

| Parameter | | Conditions | DV200-2805D | | | DV200-2812D | | | Units |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| **DYNAMIC** | | | | | | | | | |
| Load Step Output Transient | $\pm V_{OUT}$ | Half Load to Full Load | - | - | 500 | - | - | 600 | $mV_{PK}$ |
| Load Step Recovery[2] | | | - | - | 500 | - | - | 500 | µSec |
| Line Step Output Transient[4] | $\pm V_{OUT}$ | $V_{IN}$ = 18V to 40V | - | 300 | 600 | - | 600 | 1200 | $mV_{PK}$ |
| Line Step Recovery[2, 4] | | | - | 300 | 500 | - | 300 | 500 | µSec |
| Turn On Delay | $\pm V_{OUT}$ | $V_{IN}$ = 0V to 28V | - | 20 | 30 | - | 20 | 30 | mSec |
| Turn On Overshoot | | | - | - | 50 | - | - | 50 | $mV_{PK}$ |

Notes:
1. Dependant on output voltage.
2. Time for output voltage to settle within 1% of its nominal value.
3. Derate linearly to 0 at 110°C.
4. Verified by qualification testing.
5. Half load at $+V_{OUT}$ and half load at $-V_{OUT}$.
6. Up to 70% of the total power or current can be drawn from any one of the two outputs.
7. 100% output power available for $V_{IN}$ = 18V to 50V and only 60% output power available for $V_{IN}$ = 16V to 18V.

## SPECIFICATIONS ($T_{CASE}$ = -55°C to +100°C, $V_{IN}$ = +28V ± 5%, Full Load, Unless Otherwise Specified)

| ABSOLUTE MAXIMUM RATINGS | | | |
|---|---|---|---|
| Input Voltage (Continuous) | 50 $V_{DC}$ | Junction Temperature Rise to Case | +25°C |
| Input Voltage (Transient, 1 second) | 55 Volts | Storage Temperature | -65°C to +135°C |
| Output Power[1,3] | 200 Watts | Lead Solder Temperature (10 seconds) | 270°C |
| Power Dissipation (Full Load, $T_{CASE}$ = +100°C) | 44 Watts | Weight (Maximum) | 115 grams |

| Parameter | | Conditions | DV200-2815D | | | Units |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| **STATIC** | | | | | | |
| INPUT Voltage[7] | | Continuous | 16 | 28 | 50 | V |
| | | Transient, 1 sec | - | - | 55 | V |
| Current | | Inhibited | - | 6 | 10 | mA |
| | | No Load | - | 20 | 80 | mA |
| Ripple Current | | Full Load[5], 20Hz to 10MHz | - | - | 100 | $mA_{p-p}$ |
| Inhibit Pin Input[4] | | | 0 | - | 1.5 | V |
| Inhibit Pin Open Circuit Voltage[4] | | | 8 | 9.5 | 11 | V |
| UVLO Turn On | | | 13.5 | 14 | 15.8 | V |
| UVLO Turn Off[4] | | | 10 | 12 | 14 | V |
| OUTPUT Voltage | $+V_{OUT}$ | $T_{CASE}$ = 25°C | 14.85 | 15.00 | 15.15 | V |
| | $+V_{OUT}$ | $T_{CASE}$ = -55°C to +100°C | 14.775 | 15.00 | 15.225 | V |
| | $-V_{OUT}$ | $T_{CASE}$ = 25°C | 14.70 | 15.00 | 15.30 | V |
| | $-V_{OUT}$ | $T_{CASE}$ = -55°C to +100°C | 14.40 | 15.00 | 15.60 | V |
| Power[3,6,7] | Total | $V_{IN}$ = 18V to 50V | - | - | 200 | W |
| | Total | $V_{IN}$ = 16V to 18V | - | - | 120 | W |
| | $±V_{OUT}$ | $V_{IN}$ = 18V to 50V Either Output | - | - | 140 | W |
| | $±V_{OUT}$ | $V_{IN}$ = 16V to 18V Either Output | - | - | 84 | W |
| Current[3,6,7] | $±V_{OUT}$ | $V_{IN}$ = 18V to 50V Either Output | - | - | 9.3 | A |
| | $±V_{OUT}$ | $V_{IN}$ = 16V to 18V Either Output | - | - | 5.6 | A |
| Ripple Voltage | $±V_{OUT}$ | Full Load[5], 20Hz to 10MHz | - | 50 | 200 | $mV_{p-p}$ |
| Line Regulation | $+V_{OUT}$ | $V_{IN}$ = 18V to 40V | - | 10 | 80 | mV |
| | $-V_{OUT}$ | $V_{IN}$ = 18V to 40V | - | 10 | 200 | mV |
| Load Regulation | $+V_{OUT}$ | No Load to Full Load[5] | - | 10 | 80 | mV |
| | $-V_{OUT}$ | No Load to Full Load[5] | - | 10 | 200 | mV |
| Cross Regulation | $-V_{OUT}$ | V1+ Load 30% - Load 70% V2+ Load 70% - Load 30% | - | - | 550 | mV |
| Voltage Trim | | Full Load | -20 | - | 10 | % |
| EFFICIENCY | | Full Load[5] | 81 | 85 | - | % |
| LOAD FAULT POWER DISSIPATION | | Overload[4] | - | - | 80 | W |
| | | Short Circuit | - | - | 80 | W |
| CAPACITIVE LOAD[4] | | Either Output | - | - | 1000 | µF |
| SWITCHING FREQUENCY | | | 450 | 500 | 550 | kHz |
| SYNC FREQUENCY RANGE | | $V_H - V_L$ = 5V Duty Cycle = 20% - 80% | 450 | - | 550 | kHz |
| ISOLATION | | 500 $V_{DC}$, $T_{CASE}$ = 25°C | 100 | - | - | MΩ |
| MTBF (MIL-HDBK-217F) | | GB @ $T_C$ = 55°C | - | 955 | - | kHrs |

## SPECIFICATIONS ($T_{CASE}$ = -55°C to +100°C, $V_{IN}$ = +28V ± 5%, Full Load[5], Unless Otherwise Specified)

| ABSOLUTE MAXIMUM RATINGS | | | |
|---|---|---|---|
| Input Voltage (Continuous) | 50 $V_{DC}$ | Junction Temperature Rise to Case | +25°C |
| Input Voltage (Transient, 1 second) | 55 Volts | Storage Temperature | -65°C to +135°C |
| Output Power[1,3] | 200 Watts | Lead Solder Temperature (10 seconds) | 270°C |
| Power Dissipation (Full Load, $T_{CASE}$ = +100°C) | 44 Watts | Weight (Maximum) | 115 grams |

| Parameter | | Conditions | DV200-2815D | | | Units |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| **DYNAMIC** | | | | | | |
| Load Step Output Transient | $\pm V_{OUT}$ | Half Load to Full Load | - | - | 600 | $mV_{PK}$ |
| Load Step Recovery[2] | | | - | - | 500 | µSec |
| Line Step Output Transient[4] | $\pm V_{OUT}$ | $V_{IN}$ = 18V to 40V | - | 600 | 1200 | $mV_{PK}$ |
| Line Step Recovery[2, 4] | | | - | 300 | 500 | µSec |
| Turn On Delay | $\pm V_{OUT}$ | $V_{IN}$ = 0V to 28V | - | 20 | 30 | mSec |
| Turn On Overshoot | | | - | - | 50 | $mV_{PK}$ |

Notes:
1. Dependant on output voltage.
2. Time for output voltage to settle within 1% of its nominal value.
3. Derate linearly to 0 at 110°C.
4. Verified by qualification testing.
5. Half load at $+V_{OUT}$ and half load at $-V_{OUT}$.
6. Up to 70% of the total power or current can be drawn from any one of the two outputs.
7. 100% output power available for $V_{IN}$ = 18V to 50V and only 60% output power available for $V_{IN}$ = 16V to 18V.

## BLOCK DIAGRAM

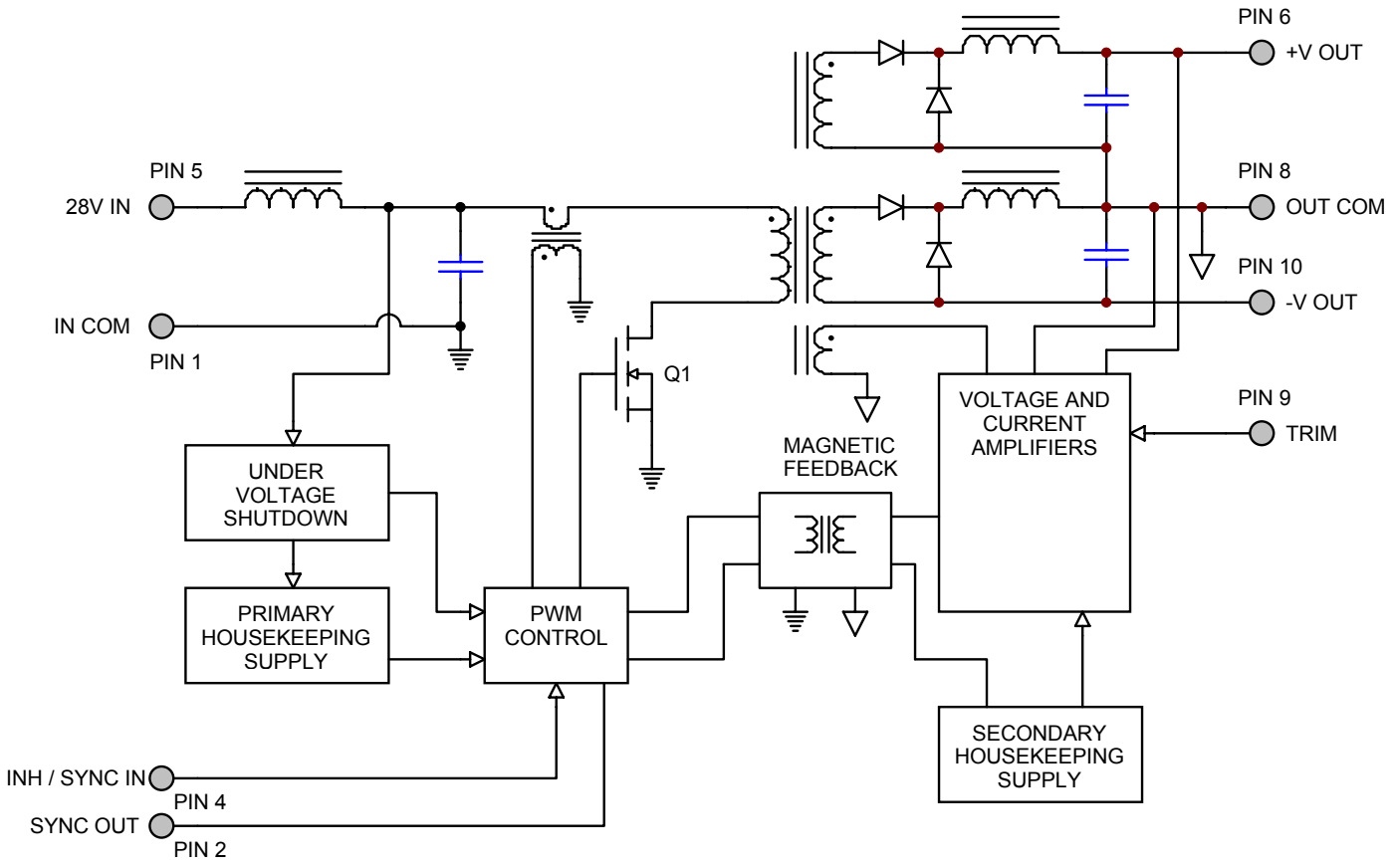



**Figure 2**

## CONNECTION DIAGRAM

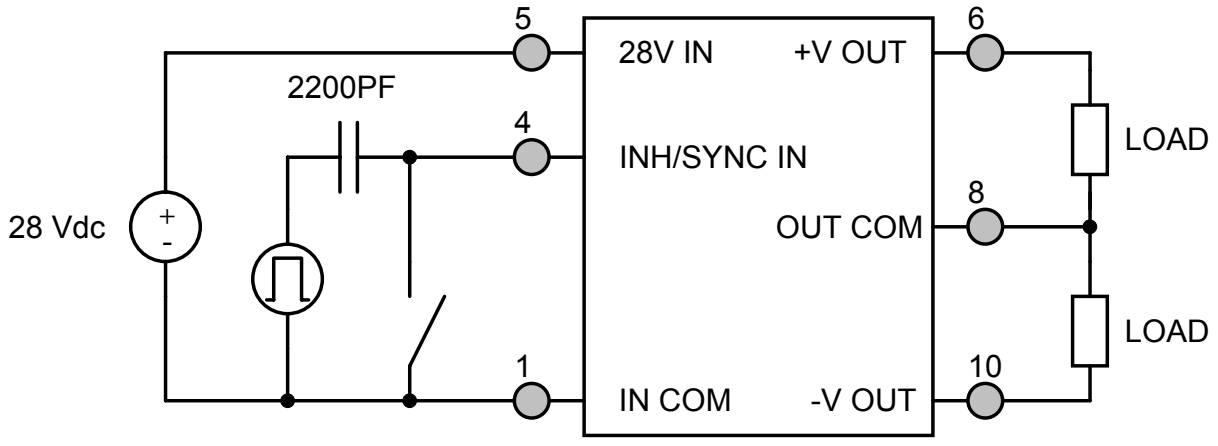



**Figure 3**

## INHIBIT DRIVE CONNECTION DIAGRAMS

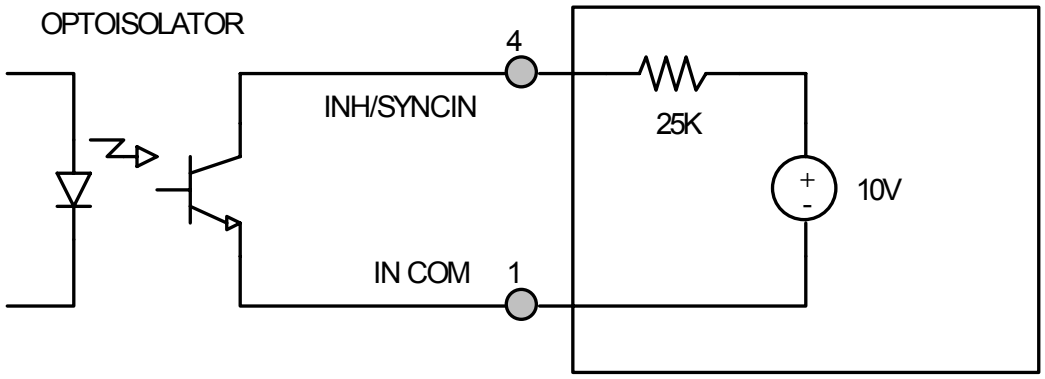
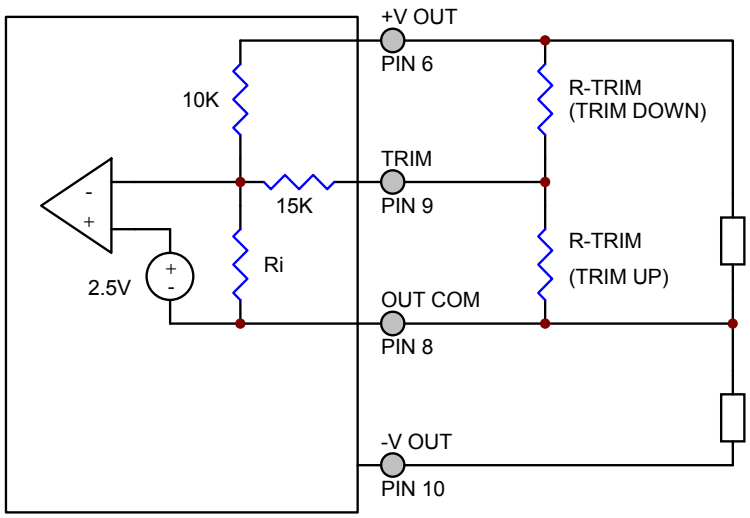



**Figure 4** – Isolated Inhibit Drive and Internal Equivalent Circuit

## OUTPUT VOLTAGE TRIM

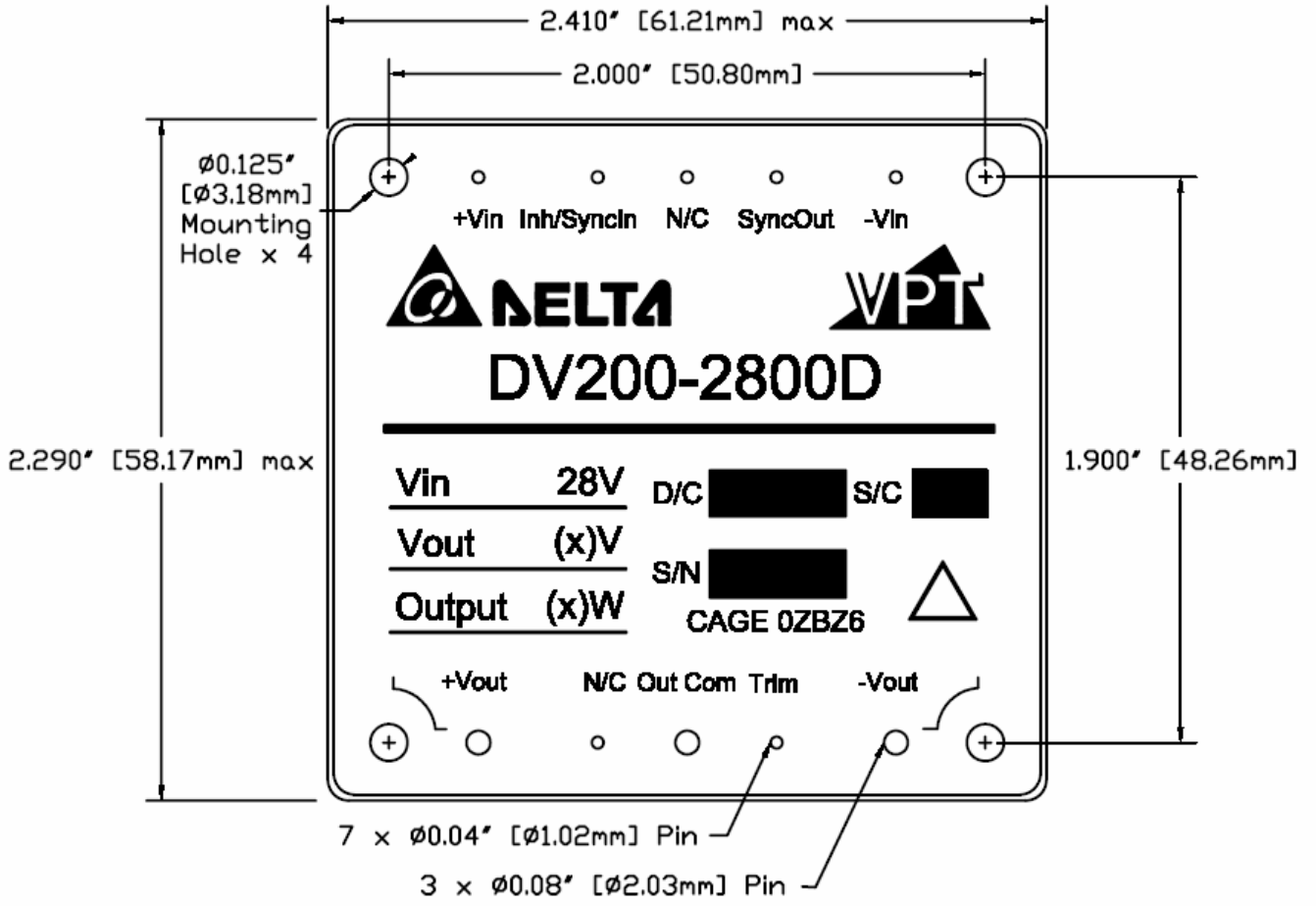



The output voltage can be trimmed down by connecting a resistor between the TRIM pin (PIN 9) and the +V OUT pin (PIN 6), or can be trimmed up by connecting a resistor between the TRIM pin (PIN 9) and the OUT COM pin (PIN 8). The maximum trim range is +10% up and –20% down. The appropriate resistor values versus the output voltage are given in the trim table below.

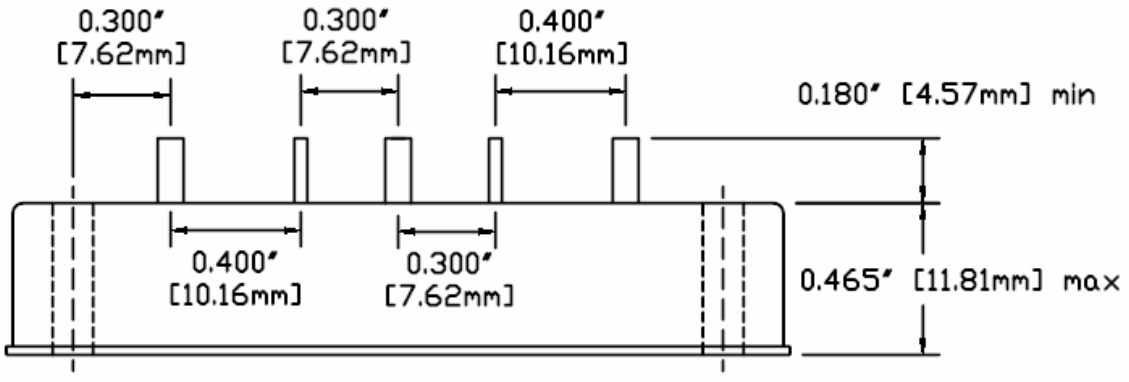
**Figure 5** – Output Voltage Trim

| DV200-2805D | | DV200-2812D | | DV200-2815D | |
|---|---|---|---|---|---|
| $\pm V_{OUT}$ (V) | $R_{TRIM}$ (Ω) | $\pm V_{OUT}$ (V) | $R_{TRIM}$ (Ω) | $\pm V_{OUT}$ (V) | $R_{TRIM}$ (Ω) |
| 5.5 | 35k | 13.2 | 5.8k | 16.50 | 1.7k |
| 5.4 | 47.5k | 13.0 | 10k | 16.25 | 5k |
| 5.3 | 68.3k | 12.8 | 16.2k | 16.00 | 10k |
| 5.2 | 110k | 12.6 | 26.6k | 15.75 | 18.3k |
| 5.1 | 235k | 12.4 | 47.3k | 15.50 | 35k |
| 5.0 | - | 12.2 | 109k | 15.25 | 85k |
| 4.9 | 225k | 12.0 | - | 15.00 | - |
| 4.8 | 100k | 11.8 | 454k | 14.75 | 475k |
| 4.7 | 58.3k | 11.6 | 213k | 14.50 | 225k |
| 4.6 | 37.5k | 11.4 | 134k | 14.25 | 142k |
| 4.5 | 25k | 11.2 | 94k | 14.00 | 100k |
| 4.4 | 16.7k | 11.0 | 70.1k | 13.75 | 75k |
| 4.3 | 10.7k | 10.8 | 54.3k | 13.50 | 58.3k |
| 4.2 | 6.3k | 10.6 | 42.9k | 13.25 | 46.4k |
| 4.1 | 2.8k | 10.4 | 34.4k | 13.00 | 37.5k |
| 4.0 | 0 | 10.2 | 27.8k | 12.75 | 30.6k |
| | | 10.0 | 22.5k | 12.50 | 25k |
| | | 9.8 | 18.2k | 12.25 | 20.5k |
| | | 9.6 | 14.6k | 12.00 | 16.7k |

## PACKAGE SPECIFICATIONS




**TOP VIEW**




**SIDE VIEW**

| PIN | FUNCTION |
|---|---|
| 1 | IN COM |
| 2 | SYNC OUT |
| 3 | N/C |
| 4 | INH / SYNC IN |
| 5 | 28V IN |
| 6 | +V OUT |
| 7 | N/C |
| 8 | OUT COM |
| 9 | TRIM |
| 10 | -V OUT |

**Figure 6** – Package and Pinout
(Dimensional Limits are ±0.005" Unless Otherwise Stated)

## PACKAGE PIN DESCRIPTION

| Pin | Function | Description |
|---|---|---|
| 1 | IN COM | Input Common Connection |
| 2 | SYNC OUT | Output Synchronization Signal |
| 3 | N/C | No Connection |
| 4 | INH / SYNC IN | Logic Low = Disabled Output. Unconnected or open collector TTL or Square-wave Synchronization Signal = Enabled Output. |
| 5 | 28V IN | Positive Input Voltage Connection |
| 6 | +V OUT | Positive Output Voltage Connection |
| 7 | N/C | No Connection |
| 8 | OUT COM | Output Common Connection |
| 9 | TRIM | Trim Output Voltage to +10%, -20% of Nominal Value |
| 10 | -V OUT | Negative Output Voltage Connection |

## ENVIRONMENTAL SCREENING

| Screening | MIL-STD-883 | Standard (No Suffix) | Military /ML |
|---|---|---|---|
| Pre-Cap Inspection | IPC-A-610 Class II | • | • |
| Temperature Cycling | -55°C, 100°C, 10 cycles | | • |
| Burn-In | 96 hours at +100°C<br>12 hours at +100°C | • | • |
| Final Electrical | 100% at -55°C, 25°C, 100°C[1]<br>100% at 25°C | • | • |
| Final Inspection | Method 2009 | • | • |

Note: 1. 100% R&R testing at –55°C, +25°C, and +100°C with all test data included in product shipment.

## ORDERING INFORMATION

| DV200- | 28 | 05 | D | /ML | - | XXX |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | | 6 |

| (1) | (2) | | (3) | |
|---|---|---|---|---|
| **Product Series** | **Nominal Input Voltage** | | **Output Voltage** | |
| **DV200-** | **28** | 28 Volts | **05**<br>**12**<br>**15** | ±5 Volts<br>±12 Volts<br>±15 Volts |

| (4) | | (5) | | (6) |
|---|---|---|---|---|
| **Number of Outputs** | | **Screening Code** | | **Additional Screening Code** |
| **D** | Dual | **None**<br>**/ML** | Standard<br>Military | Contact Sales |

Please contact your sales representative or the VPT Inc. Sales Department for more information concerning additional environmental screening and testing, different input voltage, output voltage, power requirement, source inspection, and/or special element evaluation for space or other higher quality applications.

## CONTACT INFORMATION

To request a quotation or place orders please contact your sales representative or the VPT Inc. Sales Department at:

**Phone**: (425) 353-3010
**Fax**: (425) 353-4030
**E-mail**: sales@vpt-inc.com

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